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14. ABSTRACT

Due to the current Global War on Terror (GWOT), many Army posts are experiencing frequent deployments of Soldiers. During a deployment with many Soldiers deployed from a post, it is tempting to think that there will be less demand for medical care and the post will need fewer resources to provide for the dependents of the deployed Soldiers. No statistical study has been done to evaluate the health care utilization rate of dependents in the current war on terror. The purpose of this Graduate Management Project (GMP) is to determine if there is a difference between the quantity of primary care used by dependents of deployed Soldiers and dependents of non-deployed Soldiers. Four two month periods were analyzed in 2006 and 2007 at three Army posts: Ft. Bragg, Ft. Hood and Ft. Lewis. This study compares the mean number of simple Relative Value Units (RVUs) used by those who accessed primary care in the direct care system and purchased care sectors of the Military Healthcare System.

Statistically significant differences were found between the RVU utilization means of only two of the posts: Ft. Bragg and Ft. Lewis. Because there were only statistically significant differences in two of the three posts, the results of the RVU means tests did not support a generalized conclusion that there was an increased RVU utilization by the dependents of deployed Soldiers compared to the dependents of non-deployed Soldiers. Dependents of the deployed Soldier groups, however, were consistently almost twice as likely to access primary care compared to dependents of the non-deployed Soldier groups

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A Comparison of Dependent Primary Care Utilization Rates Based on Deployments

A Graduate Management Project

Submitted to the Faculty of

Army-Baylor Graduate Program in Health and Business Administration

By

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Abstract

Due to the current Global War on Terror (GWOT), many Army posts are experiencing frequent deployments of Soldiers. During a deployment with many Soldiers deployed from a post, it is tempting to think that there will be less demand for medical care and the post will need fewer resources to provide for the dependents of the deployed Soldiers. No statistical study has been done to evaluate the health care utilization rate of dependents in the current war on terror. The purpose of this Graduate Management Project (GMP) is to determine if there is a difference between the quantity of primary care used by dependents of deployed Soldiers and dependents of non-deployed Soldiers. Four two month periods were analyzed in 2006 and 2007 at three Army posts: Ft. Bragg, Ft. Hood and Ft. Lewis. This study compares the mean number of simple Relative Value Units (RVUs) used by those who accessed primary care in the direct care system and purchased care sectors of the Military Healthcare System.

Statistically significant differences were found between the RVU utilization means of only two of the posts: Ft. Bragg and Ft. Lewis. Because there were only statistically significant differences in two of the three posts, the results of the RVU means tests did not support a generalized conclusion that there was an increased RVU utilization by the dependents of deployed Soldiers compared to the dependents of non-deployed Soldiers. Dependents of the deployed Soldier groups, however, were consistently almost twice as likely to access primary care compared to dependents of the non-deployed Soldier groups.

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Introduction

The ongoing Global War on Terror (GWOT) has had many impacts on both Soldiers who have faced multiple deployments and also family members of the Soldiers. Many Soldiers injured in the war have required extensive medical treatment to recover from their injuries (Samson, 2006). Warrior in transition units have been created in order to help facilitate the increased medical care needs of Soldiers recovering from injuries (Baldor, 2008).

While it has been recognized that Soldiers wounded in the current war require more medical resources than a traditional patient, Soldiers without obvious physical wounds and their family members may also need to access more medical resources than a traditional patient in the military medical system. The current enrollment ratio of patients to primary care physicians in the Warrior Transition Units is one physician per 200 Soldiers. The current ratio of patients to primary care physicians in a primary care clinic is one physician per 1,178 enrollees based on the Automated Staffing Assessment Model (ASAM) that the Army Medical Command (MEDCOM) uses to determine staffing requirements of military treatment facilities (MTFs). When staffing considerations are made for primary care clinics, patients under the age of 65 are expected to have 4.1 visits a year to see a primary care provider, while patients over the age of 65 are expected to visit 6.4 times a year due to having more medical needs as they age. There have been studies stating that there can be increased mental health needs of both Soldiers who have deployed and also family members during the deployment and when the Soldier returns. This along with other medical needs may cause an increase in the use of medical care by Soldiers after they deploy and by family members during the deployment of the Soldier and also after their return.

Conditions prompting this study

In the Military Healthcare System, primary care represents a large amount of the overall care utilized by all beneficiaries, including Active Duty, dependents, retirees and others. There is a current primary care shortage across the nation (Cross, 2007). The Military Healthcare System is a subset of the national medical system and also faces a shortage of primary care physicians. For many reasons, fewer medical students are choosing to enter the field of primary care, instead choosing more lucrative specialties.

Leaders within the military healthcare system must make decisions on where to place healthcare providers. They may be constrained by the rules of the funding sources, caps or limits upon salaries and the shortage of primary care providers. Large deployments of troops from a post may be viewed as an opportunity to either send fewer providers to that post or draw from the existing pool of providers at that post in order to fill shortages elsewhere. If this logic is followed, and the dependents associated with the deployed Soldiers consume an increased quantity of health care during the sponsor's deployment, this could lead to access problems in primary care at that post due to an insufficient number of available primary care providers.

Deployed Soldiers rely on the Military Healthcare System to adequately take care of their families healthcare needs while they are deployed. If they feel their family's healthcare needs are not being met, they may have a more difficult time concentrating on their missions while deployed and experience stress beyond that already created by the deployment.

It should be noted that the genesis of this case study is but one small part of many studies generated by the Decision Support Center in analyzing war trends data from the current Global War on Terror. There are large amounts of data available that capture impacts the War on Terror

has on individuals who utilize the Military Healthcare System. This study is only the first of many that will attempt to utilize the many data systems looking for impacts and trends on those served by the Military Healthcare System. The goal of these studies is to improve the care of those impacted in the current Global War on Terror.

Statement of the Problem

There have not been any reported statistical studies during the current War on Terror to determine if dependents have an increased utilization of primary health care resources during the deployment of a family member. Leaders in the Military Healthcare System need to know if they should expect family members to increase their demand for primary care resources and to what degree during a Sponsor's deployment. MEDCOM leaders can then appropriately plan how to best utilize the resources they have and attempt to mitigate any possible primary care access shortages that may occur.

Literature Review

The GWOT that started as a result of the terrorist attacks on September 11, 2001 has had many impacts on the military, especially the military medical system. As of April 2008 there have been 487 active duty deaths and 1,914 active duty wounded in action associated with Operation Enduring Freedom (Fischer, Klarman, Oboroceanu, 2008). For the Army alone there have been 384 deaths and 1,687 wounded in action (Fischer, Klarman, Oboroceanu, 2008).

Some of those wounded in action have suffered injuries such as amputations and traumatic brain injuries. Soldiers with these types of serious injuries require a much higher utilization rate of medical care resources than the average patient. Annual rates of ambulatory care visits to office-based physicians and hospital outpatient departments in the civilian sector have remained steady at 3-4 visits per person since the mid-1990's (National Center for Health

Statistics, 2006). The current annual predicted rates of primary healthcare use within the Army medical system is 4.1 visits per person under the age of 65 and 8.4 visits over the age of 65.

When military units deploy from a post many people assume that there is a decrease in health care utilization with the Soldiers' departure. However, some leaders at military treatment facilities have suggested that there is an increase in the utilization of healthcare by dependents during the deployment. There is good evidence that the severity and frequency of physical illness does not change with the stresses of family separation (McNulty, 2003). Studies on families during Operation Desert Storm/Shield have documented signs of increased stress in families when the Soldier is deployed (Lombard & Lombard, 1997). It has been documented that some children experienced the most difficulty during their father's absence, while those under the age of two experienced increased levels of stress upon their father's return (Abbe & Gavin, 1986). Other studies have shown increased frequency of family practice visits by both the mother and her children in a military setting when the spouse is deployed (Leach, Ridsdale and Smeeton, 1993). Other research suggests that the severity and frequency of physical illness did not change with the stresses of family separation, but found a decreased tolerance for what were otherwise insignificant symptoms (McNulty, 2003). A study on 299 wives and 89 children of U.S. military families living in Japan did not show a significant increase in the adult use of healthcare, however there was a significant increase in visits of children of families dealing with a deployment (McNulty, 2003).

There are many ways to evaluate the utilization of health care including: number of visits, complexity of visits and cost of visits. The Centers for Medicare and Medicaid Services (CMS), a federally funded agency, developed the resource-based relative value scale (RBRVS) as a way to capture both the complexity and time it takes healthcare providers to care for patients. CMS

began using RBRVS on January 1, 1992. Over half (56.3%) of the Health Maintenance Organizations (HMOs) paying fee-for-service to primary care physicians and specialists base their fees on the CMS Fees Schedule (RBRVS based) or a factor of it (Glass & Anderson, 2002).

The RBRVS uses the Relative Value Unit (RVU) to measure the effort that it takes to provide healthcare for patients. The RVU is the resource cost for the provision of care. It has three components: the physician work, the practice expense and malpractice expense (Glass & Anderson, 2002). On the average, the RVU work component accounts for 54% of the total RVU for a medical visit or procedure, practice expense averages 41% and malpractice insurance comprises the remaining 5% (Glass & Anderson). An example of an RVU calculation is shown in Table 1.

Table 1

Relative Value Unit Calculation

E&M Code	Description of Procedure: Outpatient Visit	RVUw	RVUpe	RVUm	Total Relative Value	Encounter
99212	Minor to low severity	0.45	0.59	0.02	1.06	1
99213	Low to moderate severity	0.67	0.72	0.02	1.41	1
99214	Moderate to high severity	1.10	1.07	0.04	2.21	1

(Note: w = physician work; pe = practice expense; m = malpractice) (Glass & Anderson, 2002)

Practice expense and malpractice expense are not applicable to providers in the military healthcare system since these are covered by the federal government. Medical providers who are federal employees receive medical malpractice coverage under the Federal Tort Claims Act (FTCA). The FTCA holds the United States legally responsible for federal healthcare providers acting within the scope of their position and training (Federal Torts Claim Act, 2006).

The Military Healthcare System only computes the physician work component of the RVU for healthcare provided in facilities owned or run by the Federal Government. Physician work has four dimensions: (1) time, (2) mental effort and judgment, (3) technical skill and physical effort and finally (4) psychological stress (Yeh, 1999). Care purchased by the Military

Healthcare System from the civilian network of providers, who have no affiliation with the Federal Government, can be broken down into simple RVUs also.

Purpose

The research question evaluated in this graduate management project (GMP) will be: Is there a statistical difference in the use of primary care between family members of deployed Soldiers and family members of Soldiers who are not deployed? The purpose of this case study will be to determine if there is an increased quantity of primary care medical services consumed by family members of Soldiers who are deployed versus dependents of Soldiers who are not deployed. If there is an increased utilization of primary care services, this could have an impact on staffing requirements for military treatment facilities with large numbers of deployed Soldiers.

Methods and Procedures

Unit of Analysis

The primary unit of analysis is individual TRICARE Prime dependents based at three Army posts. The three posts are: Ft. Bragg, Ft. Hood and Ft. Lewis. The three posts were chosen as a representative sample for this study because they all have Corps Headquarters, Division Headquarters, brigade combat teams, support brigades and aviation units that deploy frequently.

Data Collection Process

Due to the extremely large number of dependents of Army Soldiers enrolled in TRICARE Prime, three posts were chosen to produce a sample of the entire population of dependents entitled to medical care in the Army. A study of all the Army dependents would involve millions of lines of data. Ft. Bragg, Ft. Hood and Ft. Lewis are some of the largest Army posts and they have many brigade combat teams which have had repeated deployments during

the Global War on Terror. Population estimates from the Army G1 office Stationing Support Strategy Model estimated that the total number of family members of active duty Soldiers in 2009 is 566,090. The estimated number of family members of active duty members of the three posts for 2009 is: 47,629 at Ft. Bragg, 30,503 at Ft. Hood and 38,419 at Ft. Lewis. Based on these estimates, these three posts then represent 20.59% of enrolled family members. These posts were not chosen at random; there are differences in the types of units, population sizes, medical resources available and many other different variables between the posts.

This study is a retrospective analysis of fiscal years 2006 and 2007. Four periods of two months each were chosen: February and March 2006, September and October 2006, February and March 2007, September and October 2007. These four two-month periods were chosen in order to avoid having a longer period during which some Soldiers from the post may have deployed or redeployed during the time periods being analyzed. It would be more complicated to adjust for Soldiers coming and going during the period being studied, this would increase the possibility of error.

One of the data sets used was created by SRA, a company that is contracted to complete analysis of Army healthcare data by the Decision Support Center in the Office of The Surgeon General. This data set included healthcare utilization information for active duty Soldiers during periods of their deployment from October 2002 though June 2008. A file that is part of this data set also includes the Social Security numbers along with dates of deployments for active duty members from October 2002 through June 2008. This deployment data was obtained through an analysis of hazardous duty pay from the Defense Finance and Accounting Services (DFAS), with the assumption being made that if the Soldier is getting hazardous duty pay, they are deployed. This analysis to obtain the deployment data was completed by ASMR, another contractor used to

complete analysis of Army healthcare data. This data set was not created for this study alone; it already existed to be used for other war trends studies currently being conducted.

The original deployment data included a line for each deployment, which meant multiple lines for each Soldier who deployed more than once. The data set included the cumulative number of deployments, the number of the deployment, and the start and stop date for the hazardous duty pay, the country to which the Soldier was deployed, and the Soldier's Social Security number. The total number of lines in the deployment file is 1,316,377. This represents the number of individual deployments in the file from October 2002 through June 2008. The deployment data was analyzed in Excel 2007 to look at the four periods of two month each. The start and stop dates were used to determine if the Soldier was deployed during the four periods included in this study, February/March and September/October 2006 and 2007. In order to count in the deployed group, the Soldier had to receive hazardous duty pay during the entire two month period being analyzed.

Encounter data for the dependents at the three forts: Ft. Bragg, Ft. Hood and Ft. Lewis, was pulled from M2 for each of the four separate two month periods. The data pull from M2 included the date of birth, sum of encounters, sum of simple RVUs for each primary care encounter during each two month period in question, the Alternate Care Value (ACV) group of prime enrollment, the beneficiary common category (bencat), the enrollment site parent DMIS ID, the two month period being looked at, the Family Member Prefix (FMP) code, sponsor ID number, treatment parent DMIS ID number, prism area and provider specialty. The sponsor ID number is the social security number of the Soldier related to the dependent who makes the dependent eligible for TRICARE prime health coverage.

The data includes both direct care performed in military treatment facilities and also purchased care from civilian providers on the economy. The query was limited to encounters of dependents and Soldiers and also only encounters in the primary care product line. The product line of primary care includes visits to any of the following clinics: Internal Medicine Clinic, Pediatrics Clinic, Adolescent Clinic, Well Baby Clinic, Family Practice Clinic, Primary Care Clinic, Medical Examination Clinic, Immediate Care Clinic, Primary Care Clinics NEC, Flight Medicine Clinic and Undersea Medicine Clinic (DHP Metric Handbook, 2002).

The encounter data was joined with the deployment data in Access and then moved back into Excel 2007 with filters placed on many of the variables in order to identify two different groups of people using primary care for each two month period. One group was those dependents associated with a deployed Soldier who used care during a two month period; the second group was dependents not associated with a deployed Soldier during the two month period. By using the filters, eight groups of data were then collected, four associated with deployed Soldiers, four with non deployed Soldiers. The data in each line of a group consists of the sum of simple RVUs used by a dependent during the two month timeframe being examined. That person could have had a single visit or many visits during any single two month period.

The four groups of data for dependents who utilized primary care associated with deployed Soldiers were joined into one group, and the four groups of data for the dependents who utilized primary care associated with non-deployed Soldiers were joined in another group. There were then two groups to be analyzed: Those who had primary care encounters and whose sponsor was deployed at the time and those who had primary care encounters whose sponsor was not deployed at the time.

A third set of data was pulled from M2 to obtain enrollment information for the three posts: Ft. Bragg, Ft. Hood and Ft. Lewis, during the four periods in the study. The fiscal year, fiscal month, enrollment site parent DMIS ID, bencat common, ACV group, beneficiary count were obtained. This data was also joined with the deployment data in Access and then moved to Excel 2007 in order to determine the number of dependents who were eligible for care during the four periods in the study. A flag of deployed or not deployed was used to identify the total number of dependent enrollees who were associated with a deployed Soldier and the number of dependent enrollees associated with a non-deployed Soldier during the four periods of February/March and September/October 2006 and 2007. The screenshots of the encounter and eligibility data pulls from M2 can be found in appendix A.

Research Objectives

The main research objective in this case study is to determine if there is statistically significant difference in the utilization of primary care medical resources by dependents of deployed Soldiers compared to dependents of non-deployed Soldiers.

Hypotheses

Null Hypothesis

H_0: There is no difference in the mean RVUs of dependents associated with a deployed Soldier compared to the RVUs of dependents associated with a non-deployed Soldiers, among those dependents who had a primary care encounter during the periods in the study.

Alternative Hypothesis

H_a: There is a difference in the mean RVUs of dependents associated with a deployed Soldier compared to the RVU utilization rate of dependents associated with a non-deployed

Soldiers, among those dependents who had a primary care encounter during the periods in the study.

Statistics

A student's t-test was used to evaluate the mean RVUs of the deployed group and the non-deployed group at each of the three posts in SPSS version 17. The number of RVUs generated for the deployed and non-deployed family members is placed in one column, with a grouping variable of 0 used for the dependents in the deployed group and the grouping variable of 1 used for the dependents in the non-deployed group.

A chi-square test was utilized to compare the number dependents eligible for medical care compared to those that utilized care during each two month period. This is also being done by the two separate groups of dependents associated with a deployed Soldier compared to dependents associated with a non-deployed Soldier.

Descriptive Statistics

Descriptive statistics are methods used to describe data or summaries of collected data. The original deployment dataset consisted of 1,048,573 lines of data covering deployments from any post, not just the three in the study and had all months from October 2002 up through June 2008. The encounter dataset pulled from M2 consisted of 391,526 lines of data covering only the eight months of the study, February/March and September/October 2006 and 2007 at the posts in the study. The enrollment dataset pulled from M2 consisted of 690,095 lines of data covering only the eight months of the study. For each two month period, enrollment was pulled for one of the two months only and it was assumed this enrollment number stayed consistent for that two month period. Descriptive statistics can be found in Appendix A for the simple RVU data of the

final combined dataset used broken down into the three posts in this study: Ft. Bragg, Ft. Hood and Ft. Lewis.

Validity and Reliability

Validity and reliability are incorporated into the analysis. The information systems used are the same ones used by the Army Medical Command in order to manage the Military Healthcare System. It is recognized that human error can enter the system if incorrect data is entered into the system in the form of identification numbers, dates, or RVU amounts, these can all lead to errors. However, M2 is recognized as the best data repository for most corporate level analysis of the Military Healthcare System.

A test for the validity and reliability of the this case study was done using the means of the simple RVUs calculated for the two groups of dependents associated with deployed Soldiers and dependents associated with non-deployed Soldiers at each of the three posts. The mean RVUs calculated along with the number of people who accessed primary care and the enrollment numbers for the posts will be used to compare the average number of visits completed for the dependents in this study compared to current 12 month historical utilization rates seen in 2008. The more recent12 month utilization rates will be obtained from the Enrollment Capacity Model used by the Decision Support Center at The Office of the Surgeon General to monitor the number of enrollees' military treatment facilities should be able to support, including the average number of visits the population has made in primary care in the previous 12 months. This model pulls information from the M2 database also. If the numbers of visits per year from the Enrollment Capacity Model are close when compared to the average number of visits calculated with the data in this study, the validity and reliability of the results in this study will be supported.

The calculation to determine the number of visits that would be expected from the dependents in this study used the mean number of RVUs. For example, once the mean RVUs for the dependents of deployed Soldiers for an MTF is determined, this is multiplied by the number of people who accessed primary care during the eight month period at that MTF. The total number of RVUs used is divided by the total population of eligible dependents of deployed Soldiers to get an average number of RVUs used per person. Since the time periods in the study are all two months long, this average number of RVUs used per person only represents two months of a year, it is then multiplied by six to get the total number of RVUs used per person for dependents of deployed Soldiers in a year. This number is divided by the average number of RVUs per encounter for primary care visits within the Military Healthcare System which is 0.795. This number was calculated by MEDCOM Resource Management Division in 2008. The number of RVUs used per person from a group divided by the primary care average of 0.795 RVUs per encounter gives the average number of encounters per person for dependents of deployed Soldiers who are eligible for care. This same methodology was applied to dependents of deployed and non-deployed Soldiers for all three posts, and the two group's eligibility and number of RVUs used were combined at each post to create average number of visits for all dependents at each post.

Ethical Considerations

No individually identifiable information is mentioned throughout this paper. Personal healthcare identifiable information is not presented; however, individual Social Security numbers of active duty Soldiers were used to identify who was deployed during the months of the study (February/March and September/October, 2006 and 2007). The sponsor Social Security number, which is the Social Security number of the Soldier, was used to link encounter and enrollment

data obtained from the M2 database and MODS. No personal health information of the dependents was obtained other than their family member prefix number and the fact that they either did or did not access primary care healthcare during the months of the study. No reason for the visit, diagnosis, name or personal social security number of the dependent was obtained.

The deployment dataset was created by contracted analysts from SRA in the summer of 2008 for war trends analysis within the Decision Support Center, Army Office of the Surgeon General. The encounter and eligibility data sets were created by an analyst in the Decision Support Center and the three datasets were merged into two separate datasets by an SRA contractor. The final datasets used in this case study in order to analyze utilization rates at the three posts: Ft. Bragg, Ft. Hood and Ft. Lewis did not contain individual social security numbers in order to protect individual private information. This case study was reviewed by the institutional review board (IRB) at Ft. Detrick, Maryland and determined to be exempted from a formal IRB review process because it uses datasets already in existence and the final dataset used has personal health information removed from it.

Assumptions and limitations

It is assumed that all dependents of active duty continue to receive care at the post the Soldier deployed from. Some dependents do move back to where they grew up to stay with other family members during the Soldiers deployment. Under TRICARE regulations, if they are going to move back for more than 90 days, they are supposed to dis-enroll from the post they were staying at and re-enroll at the nearest MTF to where they are living. Very few people with families do this for an extended period of time as this would cause disruption in the lives of school age children. Many dependents that do leave ignore the three month rule and remain enrolled at the MTF of the post the Soldier deployed from. However, if someone did dis-enroll

from one of the three posts, Ft. Bragg, Ft. Hood and Ft. Lewis, they would not be captured in the study if their spouse was deployed since only the enrollees to these three posts were used in the M2 search for encounters.

Another assumption made in using the deployment dataset created in the summer of 2008 is that it accurately contains over 95% of all the Soldiers who deployed during the timeframe of this study in 2006 and 2007. The deployment dataset was created by ASMR using all encounter data for active duty Soldiers and running the Social Security numbers of these Soldiers against hazardous duty pay files in the Defense Finance Accounting System (DFAS) database. It is assumed that almost all Soldiers have at least one encounter within the military healthcare system and thus that the deployment dataset accurately portrays either all or nearly all the deployed Soldiers in it. A limitation in using hazardous duty pay is that a Soldier only has to be in a hazardous duty zone for one day in order to get paid hazardous duty pay for the entire month. It is therefore possible that they were not deployed the entire month, only the first or last day or few days of a month. The assumption is made that those in the deployment dataset for the months of this study were deployed the entire month.

A limitation in the study is that if the family is dual military, it is possible that dependents of the deployed Soldier will be missed. If the children of the deployed Soldier are not enrolled under the deployed Soldier but instead a spouse who is a Soldier and non-deployed, they would fall into the non-deployed group if they had primary care visits during the study. A study in 2005 states that out of the 750,320 Active Duty members who are married, 12.7% are in dual-military marriages, out of the 426,296 Selected Reserve members who are married, 5% were in a dual-military marriage (Military Family Research Institute, 2005). While 12.7 % of the Soldiers deployed who are married then could be married to another Soldier, at least half of the children

who are dependents would be likely to be sponsored by the deployed Soldier, reducing the risk of children of deployed Soldiers being missed to 6.4% or less.

Results

Aggregated results are reported in table 2. Since the three posts: Ft. Bragg, Ft. Hood and Ft. Lewis are separate sites; their results are reported individually. The total number of RVUs expected to be used annually by an enrolled dependent is calculated using the mythology described in the validity and reliability section.

Ft. Bragg

Ft. Bragg had a total of 22,075 dependents that used care when the number who used care is summed for all four periods, or 5518.75 on the average during any single two month period. The mean simple RVUs consumed is 1.213 for any person in the deployed group during a single two month period. The total number of people for the non-deployed dependent group was

Table 2
Results by post

	Fort Bragg		Fort Hood		Fort Lewis	
	Deployed	**Non-deployed**	**Deployed**	**Non-deployed**	**Deployed**	**Non-deployed**
Enrollment Total *	45,265	239,412	40,559	186,531	28,705	164,772
Utilization Total *	22,075	60,035	18,536	42,996	12,177	43,457
Used Care %**	48.78	25.08	45.70	23.05	42.42	26.37
Mean RVU/Person 2 Month Period	1.213	1.196	1.172	1.164	1.277	1.302
Enrollment 2 Month Average	11,314	59,853	10,140	46,633	7,176	41,193
RVU Utilization Projected Annually/Person	3.552	1.800	3.212	1.610	3.250	2.060
Visits/Person/Year	4.46	2.26	4.04	2.02	4.09	2.59
Post Average Visits/Person/Year	2.61		2.38		2.81	
Capacity Model Post Average	3.1		3.3		3.7	

(* Note that these totals are for all four two month periods aggregated, Utilization Total is number of encounters.

** Used care is the percent that had some type of primary care encounter).

60,035, or 15008.75 on the average during any single two month period. The mean simple RVUs used is 1.196 for any person in the non-deployed group during one two month period. The difference between the means is significant at .000 (α - .05), with those dependents who are associated with deployed Soldiers having a higher simple RVU average. (See Table 2).

Treating each two month period as a separate period, the total enrollment for dependents associated with deployed Soldiers is 45,256 or on the average, 11,314 during any single two month period. The total who utilized care is 22,075, which is a utilization rate of 48.78%. The total enrollment for dependents associated with non-deployed Soldiers is 239,412, or on the average 59853 during any single two month period. The total who utilized care is 60,035, which is a utilization rate of 25.08%. This means that dependents of deployed Soldiers accessed care twice as much as those dependents associated with non-deployed Soldiers.

The Chi-Square analysis of enrollment and utilization numbers for dependents of deployed Soldiers at Ft. Bragg produced an expected utilization count of 14,522.12, while the observed rate was 22,075. The Chi-Square analysis for dependents of non-deployed Soldiers produced an expected utilization rate of 67,587, while the observed rate was 60,035. Chi-Square results are in table 3 and appendix B.

Using the mean simple RVUs for the two groups of dependents to calculate the number of visits expected each year from the two groups based on the average enrollment produced 4.46 visits for the dependents of deployed Soldiers group and 2.26 visits for dependents of non-deployed Soldiers group. These average numbers of visits created an overall average of 2.61 visits for all dependents at Ft. Bragg. The Capacity Model produces a value of 3.1. The calculations followed the mythology described in the validity and reliability section.

Table 3

Chi-Square results Ft. Bragg

Observed Frequencies

	Deployed	Nondeployed	Total
Enrollment Total	42,265	239,412	281,677
Utilization Total	22,075	60,035	82,110
Total	64,340	299,447	363,787

Expected Frequencies

	Deployed	Nondeployed	Total
Enrollment Total	49,817.88	231,859.1	281,677
Utilization Total	14,522.12	67,587.88	82,110
Total	64,340	299,477	363,787
Level of Significance	.05		
Critical Value	3.841		
Chi-Square Test Statistic	6,163.37		
***p*-Value**	0		

Ft. Hood

Ft. Hood had a total of 18,536 dependents that used care over all four periods, or 4634 on average during any single two-month period. The mean simple RVUs used is 1.172 for any person in the deployed group during a single two month period. The total for the non-deployed dependent group was 42,996, or 10,749 on the average during any single two month period. The mean simple RVUs used is 1.164 for any person in the non-deployed group during one two month period. The difference between the means is not significant at the $p < .05$ level, although

those dependents who are associated with deployed Soldiers had a higher simple RVU average. (See Table 2).

Treating each two month period as a separate period, the total enrollment for dependents associated with deployed Soldiers is 40,559, or on the average 10,140 during any single two month period. The total who utilized care is 18,536, which is a utilization rate of 45.70%. The total enrollment for dependents associated with non-deployed Soldiers is 186,531, or on the average 46,633 during any single two month period. The total who utilized care is 42,996, which is a utilization rate of 23.05%. This means that dependents of deployed Soldiers accessed care twice as much as those dependents associated with non-deployed Soldiers.

The Chi-Square analysis of enrollment and utilization numbers for dependents of deployed Soldiers at Ft. Hood produced an expected utilization rate of 12,598.6, while the observed rate was 18,536. The Chi-Square analysis for dependents of non-deployed Soldiers produced an expected utilization rate of 48,933, while the observed rate was 42,996. The Chi-Square results at listed in table 4 and appendix B.

Using the mean simple RVU's for the two groups of dependents to calculate the number of visits expected each year from the two groups based on the average enrollment produced 4.04 visits for the dependents of deployed Soldiers group and 2.02 visits for dependents of non-deployed Soldiers group. These average numbers of visits created an overall average of 2.38 visits for all dependents at Ft. Hood. The Capacity Model produces a value of 3.3 visits per person per year. The calculations followed the mythology described in the validity and reliability section.

Table 4

Chi-Square results Ft. Hood

Observed Frequencies

	Deployed	Nondeployed	Total
Enrollment Total	40,559	186,531	227,090
Utilization Total	18,536	42,996	61,532
Total	59,095	229,527	288,622

Expected Frequencies

	Deployed	Nondeployed	Total
Enrollment Total	46,496.4	180,593.6	227,090
Utilization Total	12,598.6	48,933.4	61,532
Total	59,095	229,527	288,622
Level of Significance	.05		
Critical Value	3.841		
Chi-Square Test Statistic	4,471.95		
***p*-Value**	0		

Ft. Lewis

Ft. Hood had a total of 12,177 dependents that used care when the number who used care is summed for all four periods, or 3044.25 on the average during any single two month period. The mean simple RVUs used is 1.277 for any person in the deployed group during one two month period. The total for the non-deployed dependent group was 43,457, or 10,864.25 on the average during any single two month period. The mean simple RVUs used is 1.302 for any person in the non-deployed group during one two month period. The difference between the means is significant at .006 (α - .05), Ft. Lewis is different than Ft. Bragg or Ft. Hood as the

dependents who are associated with non-deployed Soldiers has a higher RVU average. (See Table 2).

Treating each two month period as a separate period, the total enrollment for dependents associated with deployed Soldiers is 28,705, or on the average 7176 during any single two month period. The total who utilized care is 12,177 which is a utilization rate of 42.42%. The total enrollment for dependents associated with non-deployed Soldiers is 164,772, or on the average 41,193 during any single two month period. The total who utilized care is 43,457, which is a utilization rate of 26.37%. This also means that dependents of deployed Soldiers accessed care nearly twice as much as those dependents associated with non-deployed Soldiers; however the

Table 5

Chi-Square results Ft. Lewis

Observed Frequencies

	Deployed	Nondeployed	Total
Enrollment Total	28,705	164,772	193,477
Utilization Total	12,177	43,457	55,634
Total	40,882	208,229	249,111

Expected Frequencies

	Deployed	Nondeployed	Total
Enrollment Total	31,751.82	161,725.2	193,477
Utilization Total	9,130.184	46,503.82	55,634
Total	40,882	208,229	55,634
Level of Significance	.05		
Critical Value	3.841		
Chi-Square Test Statistic	1,566.13		
***p*-Value**	0		

difference is lower than either Ft. Bragg or Ft. Hood.

The Chi-Square analysis of enrollment and utilization numbers for dependents of deployed Soldiers at Ft. Lewis produced an expected utilization rate of 9,130.184, while the observed rate was 12,177. The Chi-Square analysis for dependents of non-deployed Soldiers produced an expected utilization rate of 46,503.82, while the observed rate was 43,457). The Chi-Square results for Ft. Lewis are available in table 5 and appendix B.

Using the mean simple RVU's for the two groups of dependents to calculate the number of visits expected each year from the two groups based on the average enrollment produced 4.09 visits for the dependents of deployed Soldiers group and 2.59 visits for dependents of non-deployed Soldiers group. These average numbers of visits created an overall average of 2.81 visits for all dependents at Ft. Hood. The Capacity Model produces a value of 3.7 visits per person per year. The calculations followed the mythology described in the validity and reliability section.

Discussion

The results do show that a significantly higher number of dependents of deployed Soldiers accessed primary care at all three of the posts compared to dependents of non-deployed Soldiers during the eight months that were analyzed in the study. The percentage of dependents that accessed care from the deployed Soldier groups for Ft. Bragg, Ft. Hood and Ft. Lewis were 50.65%, 47.26% and 43.75% respectively. The percentage of dependents who accessed care from the dependents of non-deployed Soldiers was 25.60%, 23.48% and 26.85% respectively. This means that on average almost twice as many people from the dependents of deployed Soldiers accessed primary care. It is important to note that the number of simple RVUs was

totaled for anyone who accessed care, not the number of visits the person made during each two month period in the study. This was done because both direct care within the military healthcare system and purchased care from the economy were used. The way purchased care is entered into the M2 database often bundles visits into one charge, making it impossible to tell how many actual visits are associated with that charge.

The Chi-Square analysis of the observed number of people who utilized care and the enrolled people who were eligible to use care was significantly different at each post with a *p* of .000 at each post. Table 6 shows that the number of dependents of deployed Soldiers who utilized care was higher at all three posts compared to what the calculated expected utilization rates were. It also shows that the number of dependents of non-deployed Soldiers was lower than the expected rate at all three posts. This shows that there are a statistically higher number of dependents of deployed Soldiers accessing primary care than would be expected for the population.

Table 6

Chi-Square Observed and Expected Results

	Ft. Bragg		Ft. Hood		Ft. Lewis	
Utilization	**Deployed**	**Nondeployed**	**Deployed**	**Nondeployed**	**Deployed**	**Nondeployed**
Observed	22,075	60,035	18,536	42,996	12,177	43,457
Expected	14,522.12	67,587.88	12,598.6	48,933.4	9,130.18	46,503

This higher frequency of accessing primary care by dependents of deployed Soldiers is an important finding for healthcare leaders within the military healthcare system. If there is a large deployment taking place at an individual post, this means that the dependents of the deployed Soldiers may be more likely to seek primary care during the deployment. While the ASAM model helps to figure out the number of provider and support staff needed within the MEDCOM with an expected utilization rate of 4.1 visits a year per beneficiary under the age of 65, each post

experiences its own actual utilization rate. Historically, posts with a younger enrolled population on the average experience a lower utilization rate than posts with an older enrolled population or a post with a large number of retirees in the area who use the direct care system for medical care.

The medical system supporting a post adapts to the actual utilization rate that it is experiencing. If this number is lower compared to the Army average and the post has been meeting access with fewer primary care physicians because the population seeks fewer visits each year than the ASAM model would predict, then a sudden increase in those seeking medical care will overwhelm the system. Thus if there are several clinics on a large post supporting primarily dependents of active duty Soldiers and a large deployment occurs, these clinic may not be able to meet the increased access demand that will most likely occur based on the findings in this case study.

The mean number simple RVUs consumed by those who accessed primary medical care were higher only at Ft. Bragg and Ft. Hood. The means for the dependents of deployed Soldiers was 1.214 and 1.171 respectively, while the means for the dependents of non-deployed Soldiers was 1.196 and 1.164. The difference for the two posts was only statistically significant at Ft. Bragg (p .000). At Ft. Lewis, the mean simple RVUs was higher for the dependents of non-deployed Soldiers at 1.302 compared to dependents of deployed Soldiers at 1.276, and this difference was statistically significant (p = .000).

Based on these mixed results you can only make statements about each individual post, not generalized statements about an increase or decreased number of RVUs used by those who accessed care. While a difference of 0.018 RVUs between the means does not seem to be much, it can be significant if a large population is being considered. Ft. Bragg had average of 5518.75 people in the dependents of deployed Soldiers during any two months of the four two month

periods in the study. If you multiply the difference of .018 RVUs by the average of 5518.75 dependents the result is 99.375 RVUs. Using the current known average simple RVUs within MEDCOM for a primary care appointment of .795, this would equate to 125 primary care visits in a two month period. This would be 125 visits above what that part of the population was originally utilizing, so if the clinic or clinics they were assigned to were already having access problems, this will only add more stress to the system.

It must be noted that since RVUs were used and not actual visit counts, it is not fully clear how many more visits to primary care the group of 5518.75 dependents of deployed Soldiers at Ft. Bragg would make. More complex visits can also increase the number of RVU's per visit, which could raise the number of RVU's for a primary care visit for this group above the MEDCOM average of .795. However, more complex visits often take more time, which would still put an additional access stress on a clinic treating dependents of deployed Soldiers at Ft. Bragg.

Due to fact that the difference between the means of the number of RVU's is only significant at Ft. Bragg and Ft. Lewis, and only at Ft. Bragg was the mean higher (1.213) for the group of dependents of deployed Soldiers, it is not clear that this group commonly utilizes more care when they do access primary care. It is clear that they are twice as likely to access care at the three posts in this case study, but it is not clear that they commonly use more visits when they do access care or that their care is more complex. In order to use this type of analysis across the Army, each post would have to examine the means for the two groups themselves.

The validity of the analysis in this case study is supported by the extremely large amounts of data that were used and also the matching up of several large data sets to obtain the number of people from the two groups of dependents who were eligible and who used primary care during

the months in the study. The number of visits per year per person for dependents at each post was close to the numbers in the Eligibility Capacity Model (see table 2). At all three posts, the numbers calculated for the dependents were lower than the stated numbers in the Eligibility Capacity Model. This can be explained by the fact that the Eligibility Capacity Model includes active duty Soldiers and retirees who may drive up the overall utilization rate for each post. However, since the number of visits per person per year differs by 0.49 at Ft. Bragg, 0.92 at Ft. Hood and 0.89 at Ft. Lewis, in can be inferred that the numbers of RVUs used in this study obtained from M2 are fairly accurate.

Recommendations

This method of evaluating the primary health care utilization rates of dependents is only one way of analyzing utilization rates. The use of large data sets such as the deployment data, health care utilization data from M2 and enrollment data from M2 all come with a certain level of risk as to the reliability and validity of the data sets. The possibility of human error in either reporting or entering data, along with the possibility of error in handling such large data sets is present. Another suggested route for future research would be to follow one or more brigade combat teams before, during and after a deployment to see if there is a difference in the health care utilization rates of dependents, Soldiers or groups. The results of this study could be compared with one or more brigade combat teams which did not deploy from the same site during the same timeframe.

Other possible research would include regression analysis using multiple variables such as the age and sex of the people from the dependents of deployed Soldiers group compared to the dependents of non-deployed Soldiers group. This would help identify if females are more likely to seek care than males, if there is a difference in the age of the dependent, if children are more

likely to be brought in for care during the deployment of the Soldier and other unknown correlations that may appear by analyzing the data. All of these studies would benefit the military medical community to better prepare for meeting the medical needs of dependents during the deployments of Soldiers.

Conclusion

Dependents of deployed Soldiers at the three posts in this case study did show a significantly higher rate of accessing primary care medical resources compared to dependents of non-deployed Soldiers over the two month periods in this study. The results of the tests of simple RVU means by those who accessed care at the three posts: Ft. Bragg, Ft. Hood and Ft. Lewis did have statistical significance at two of the three posts, but the results were mixed. There was no general trend of RVU utilization between the two groups of dependents of deployed Soldiers compared to dependents of non-deployed Soldiers.

Leadership within the Army military medical system need to be aware of the higher rate seen in accessing primary care by the dependents of deployed Soldiers at the three posts: Ft. Bragg, Ft. Hood and Ft. Lewis. This case study suggest that if a large deployment is taking place, the leadership needs to make sure that the primary care resources available for the dependents are sufficient and they may need to be augmented during the period of the deployment. It is very important that leadership realize that taking away resources from MTFs with a large percentage of dependents of deployed Soldiers will likely lead to worsening access problems. Individual posts may analyze the mean RVU utilization rates of dependents of deployed versus non-deployed Soldiers to see if there is a statistically significant higher mean in the deployed groups at their post. This would also be an additional indication of the resource requirements to provide adequate care for the population the post supports.

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Appendix A

Figure 1

Screenshot of M2 pull for standard ambulatory data report primary care.

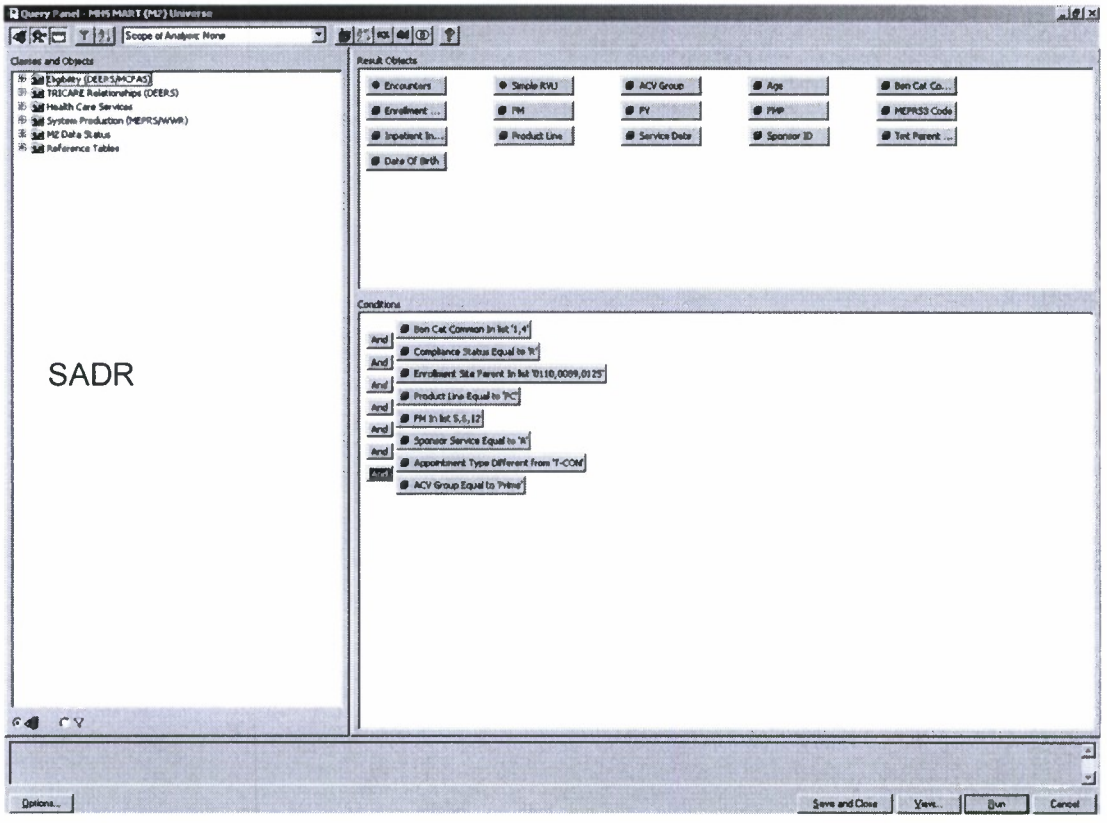


Figure 2

Screenshot of M2 pull for Tricare encounter non-institutional (outpatient), primary care.

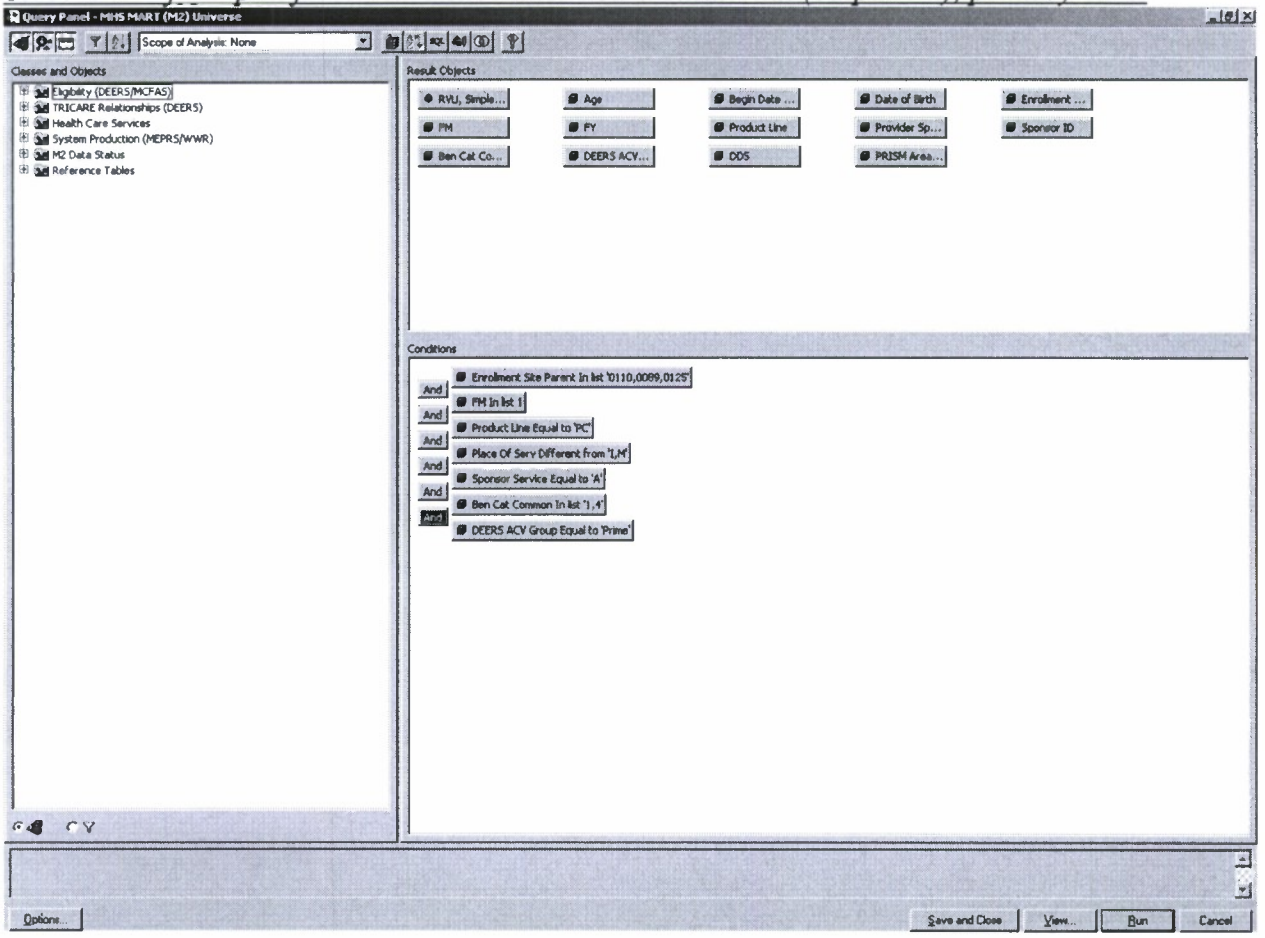
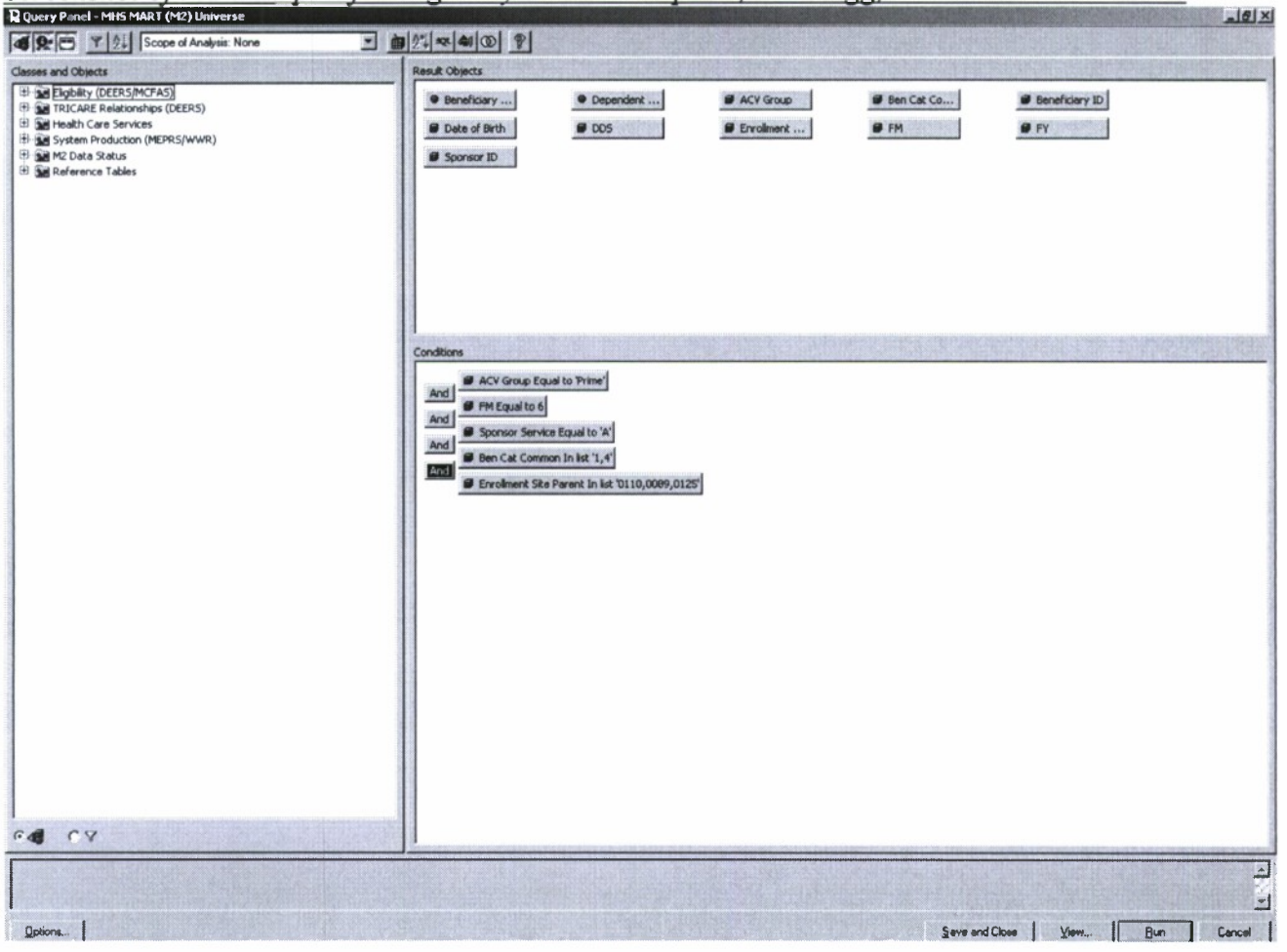


Figure 3

Screenshot of M2 data pull for eligibility at the three posts, Ft. Bragg, Ft. Hood and Ft. Lewis



Appendix B

Table 7

Descriptive Statistics Simple RVU Counts

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Deployed0089	22075	.0000	19.6600	1.213625	.9451359	57.240	.033
nondeployed0089	60035	.0000	19.4700	1.196454	1.0694751	63.151	.020
Deployed0110	18536	.0000	19.1000	1.171548	.8446240	52.751	.036
nondeployed0110	42996	.0000	19.3200	1.163802	.8875822	59.050	.024
deployed0125	12177	.0000	17.9100	1.275854	1.0109858	42.685	.044
nondeployed0125	43457	.0000	19.9900	1.302076	1.0701211	45.096	.023
deployedall	52788	.0000	19.6600	1.213205	.9280676	52.519	.021
nondeployedall	146488	.0000	19.9900	1.218204	1.0211952	57.309	.013
Valid N (listwise)	12177						

(Note: 0089 Ft. Bragg, 0110 Ft. Hood, 0125 Ft. Lewis)

Figure 4

Simple RVU Counts for Dependents of Deployed Soldiers at Ft. Bragg

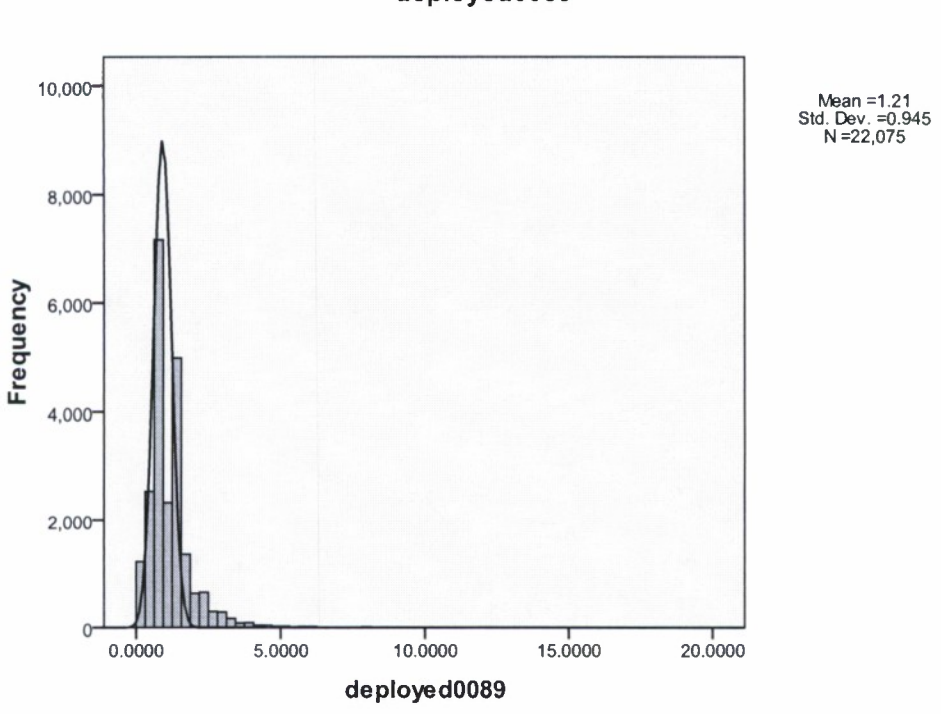


Figure 5

Simple RVU Counts for Dependents of Non-Deployed Soldiers at Ft. Bragg

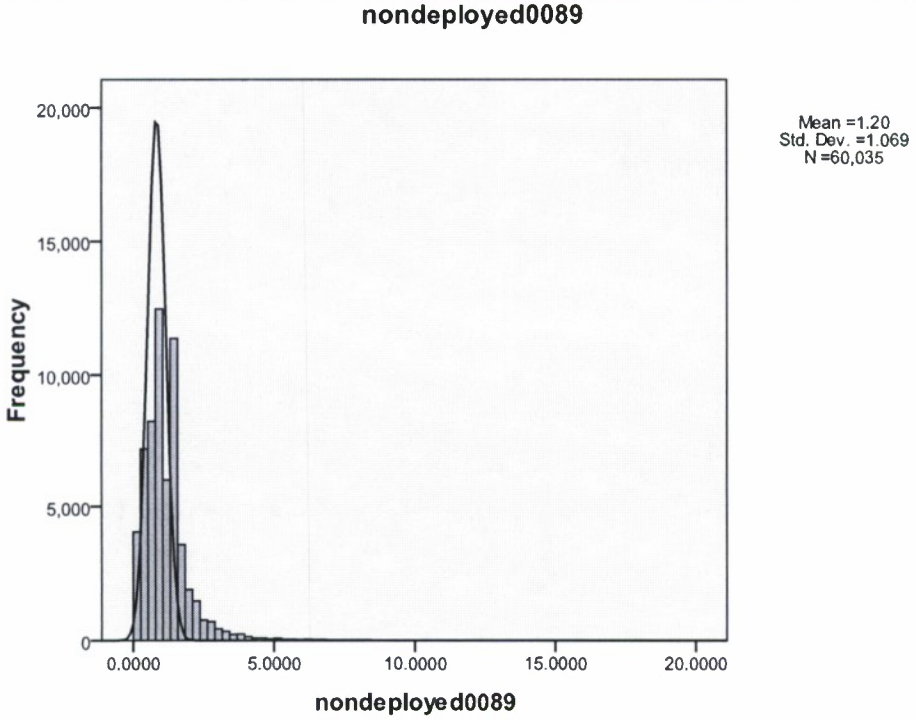


Figure 6

Simple RVU Counts for Dependents of Deployed Soldiers at Ft. Hood

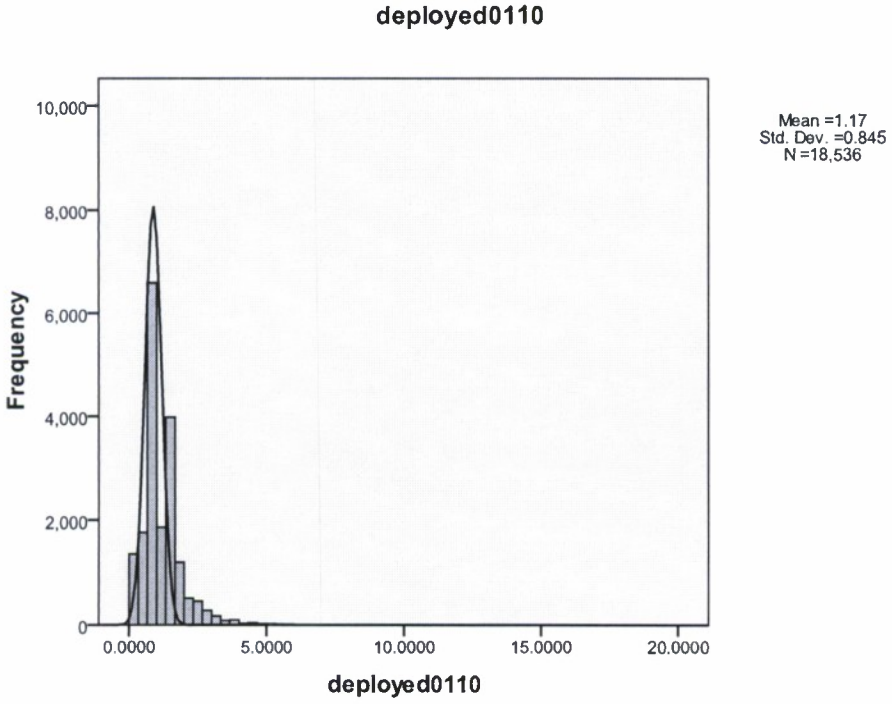


Figure 7

Simple RVU Counts for Dependents of Non-Deployed Soldiers at Ft. Hood

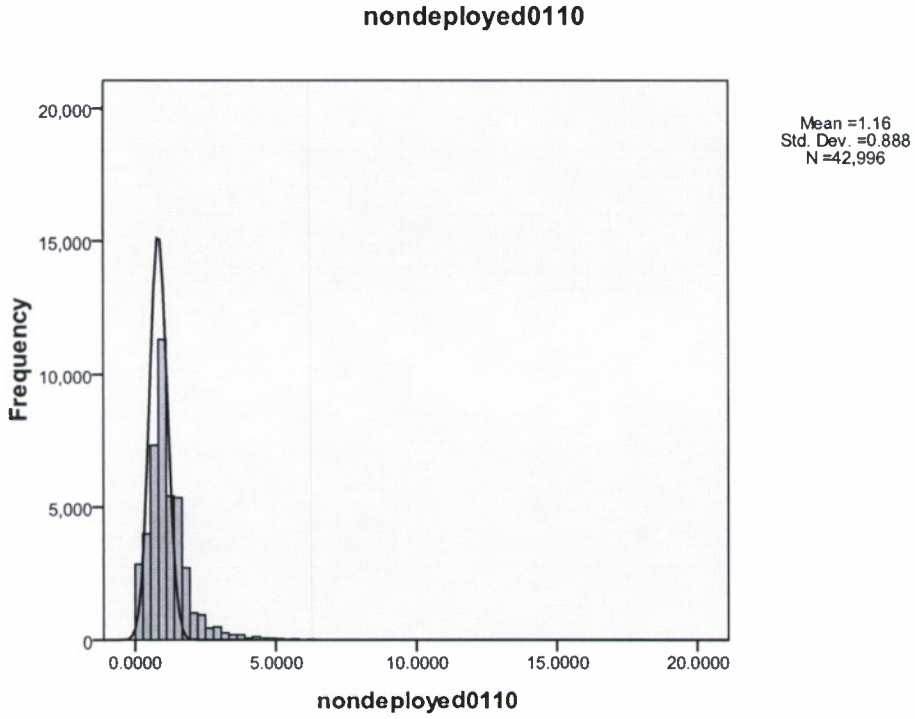


Figure 8

Simple RVU Counts for Dependents of Deployed Soldiers at Ft. Lewis

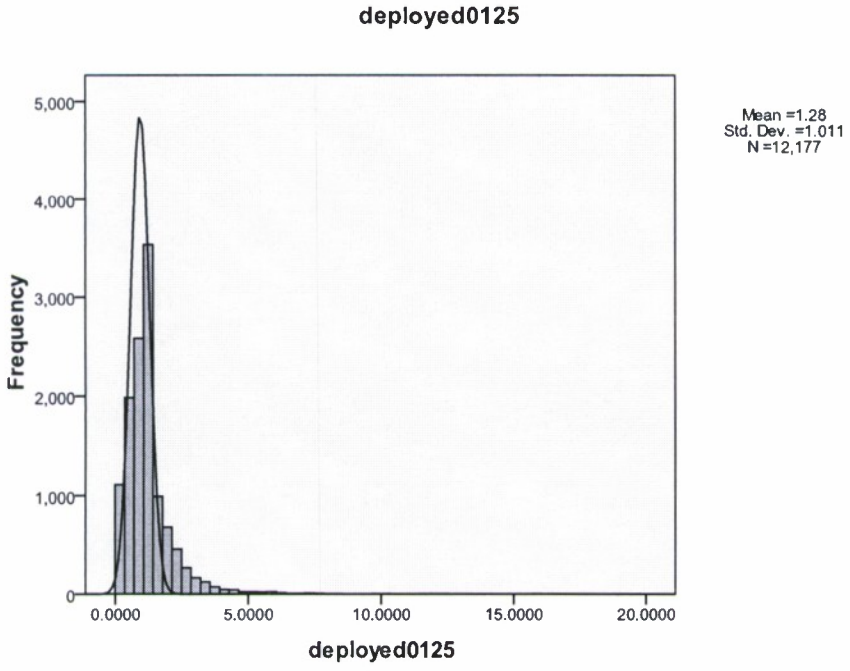
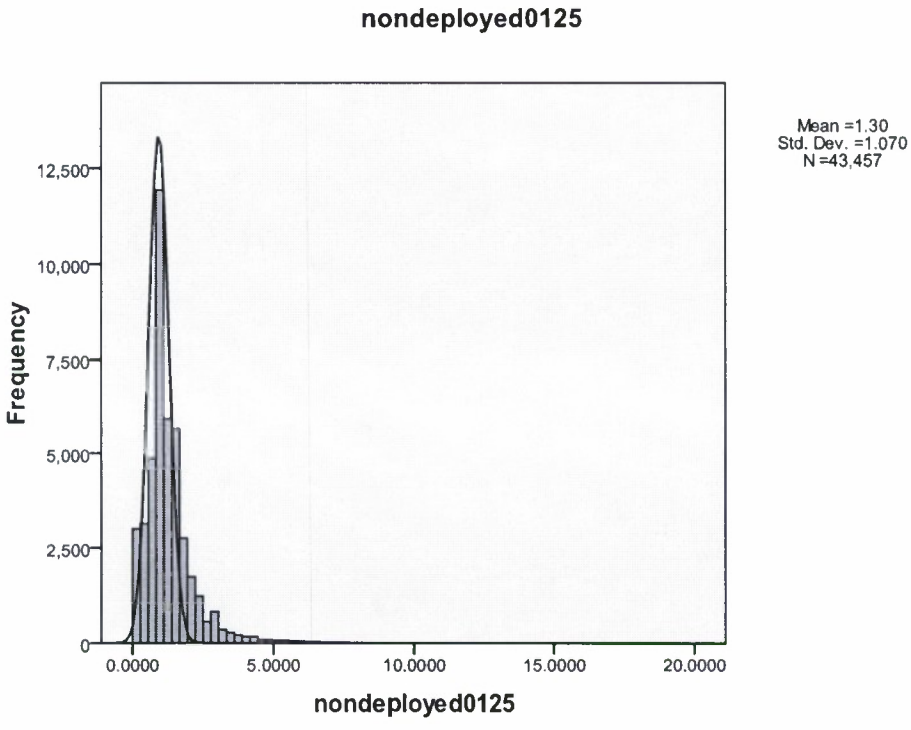


Figure 9

Simple RVU Counts for Dependents of Non-Deployed Soldiers at Ft. Hood



Appendix C

Students T-Test Results of Mean Simple RVU Comparisons

Fort Bragg DMIS 0089

Group Statistics

	groupin g0089	N	Mean	Std. Deviation	Std. Error Mean
total0089	0	22075	1.213625	.9451359	.0063613
	1	60035	1.196454	1.0694751	.0043648

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
total0089	Equal variances assumed	35.516	.000	2.103	82108	.036	.0171712	.0081666	.0011648	.0331776
	Equal variances not assumed			2.226	44153.766	.026	.0171712	.0077148	.0020501	.0322923

Fort Bragg Chi Square

Observed Frequencies

Row variable	Column variable: Deployed	Nondeployed	Total
Enrollment Total	**42265**	**239412**	**281677**
Utilization Total	**22075**	**60035**	**82110**
Total	**64340**	**299447**	**363787**

Expected Frequencies

Row variable	Column variable: Deployed	Nondeployed	Total
Enrollment Total	49817.88	231859.1	281677
Utilization Total	14522.12	67587.88	82110
Total	64340	299447	363787

Data	
Level of Significance	**0.05**
Number of Rows	2
Number of Columns	2
Degrees of Freedom	1
Results	
Critical Value	**3.84146**
Chi-Square Test Statistic	**6163.37**
***p*-Value**	**0**

Reject the null hypothesis

Ft. Hood DMIS 0110

Group Statistics

	groupin g0110	N	Mean	Std. Deviation	Std. Error Mean
total0110	0	18536	1.171548	.8446240	.0062038
	1	42996	1.163802	.8875822	.0042805

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
total0110	Equal variances assumed	1.712	.191	1.008	61530	.314	.0077461	.0076872	-.0073208	.0228131
	Equal variances not assumed			1.028	36789.543	.304	.0077461	.0075372	-.0070270	.0225192

Fort Hood Chi-Square

Observed Frequencies

	Column variable		
Row variable	**Deployed**	**Nondeployed**	**Total**
Enrollment Total	**40559**	**186531**	**227090**
Utilization Total	**18536**	**42996**	**61532**
Total	**59095**	**229527**	**288622**

Expected Frequencies

	Column variable		
Row variable	C1	C2	Total
R1	46496.4	180593.6	227090
R2	12598.6	48933.4	61532
Total	59095	229527	288622

Data	
Level of Significance	**0.05**
Number of Rows	2
Number of Columns	2
Degrees of Freedom	1
Results	
Critical Value	**3.84146**
Chi-Square Test Statistic	**4471.95**
***p*-Value**	**0**

Reject the null hypothesis

Ft. Lewis DMIS 0125

Group Statistics

	groupin g0125	N	Mean	Std. Deviation	Std. Error Mean
total0125	0	12177	1.275854	1.0109858	.0091617
	1	43457	1.302076	1.0701211	.0051334

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
fulltotalall	Equal variances assumed	58.085	.000	-.987	199274	.323	-.0049989	.0050631	-.0149225	.0049248
	Equal variances not assumed			-1.033	101907.650	.302	-.0049989	.0048410	-.0144872	.0044894

Fort Lewis Chi-Square

Observed Frequencies

Row variable	Column variable: Deployed	Nondeployed	Total
Enrollment Total	**28705**	**164772**	**193477**
Utilization Total	**12177**	**43457**	**55634**
Total	**40882**	**208229**	**249111**

Expected Frequencies

Row variable	Column variable: Deployed	Nondeployed	Total
Enrollment Total	31751.82	161725.2	193477
Utilization Total	9130.184	46503.82	55634
Total	40882	208229	249111

Data	
Level of Significance	**0.05**
Number of Rows	2
Number of Columns	2
Degrees of Freedom	1
Results	
Critical Value	**3.84146**
Chi-Square Test Statistic	**1566.13**
***p*-Value**	**0**

Reject the null hypothesis